

High-Speed FPGA Image Decoder, Phase I

Completed Technology Project (2009 - 2009)



Project Introduction

NASA space imagery is gathered and transmitted back to earth in many formats. One of the newer formats is the lossy/lossless image format CCSDS (CCSDS 122.0-B-1), which uses wavelet decomposition combined with a bitplane encoder to achieve good data rates while keeping visual fidelity. It was designed for space missions, and in particular is designed to implement in low power hardware. This solicitation calls for creating a hardware solution capable of decoding 16-bit image samples from this format, called in this document the "CCSDS" image format, at the rate of 640 Mbps, presumably for ground based image acquisition systems. Cybernet teaming with University of Dayton Research Institute proposes to design and build a FPGA based hardware image decoder capable of decoding 16-bit samples with a rate at least 640 Mbps, which, given the specifics of the image specification, is completely feasible. Dr. Chris Lomont at Cybernet is currently PI on a project implementing precisely the CCSDS 122.0-B-1 specification and transcoding algorithms for a NASA Phase II SBIR, and is intimately familiar with the format. This coupled with Cybernet's long history of designing and delivering hardware solutions makes us a perfect fit for this project.

Anticipated Benefits

Cybernet has many imaging and hardware products, and the incorporation of this hardware technology will make their platforms better solutions to their customers. Through two CCSDS 122.0-B-1 SBIR contracts, Cybernet has the expertise to develop and market this hardware to other space agencies that are members of CCSDS. Finally it makes good sense for Cybernet to leverage our internal investment in CCSDS and image processing technologies. NASA has a large investment in low-bandwidth image transmission, and is furthering this with their CCSDS lossy image compression format. The specification is finalized, and in order to become really useful there needs to be a fast decoding solution for receiving data from space. This hardware can be designed and built by Cybernet for low cost, which can then be deployed throughout NASA for dealing with data coming back from satellites. The resulting device can be sold to the many other space agencies that are members of CCSDS.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

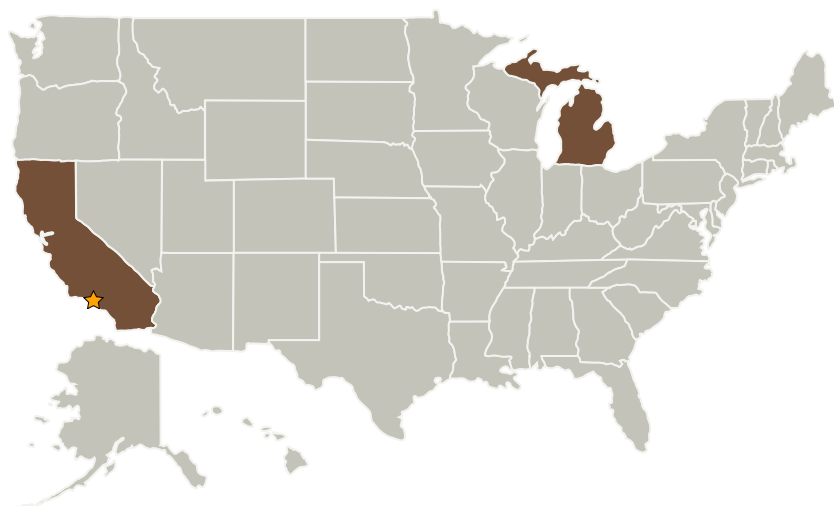
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Cybernet Systems Corporation	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations

California	Michigan
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Celestino Jun Rosca

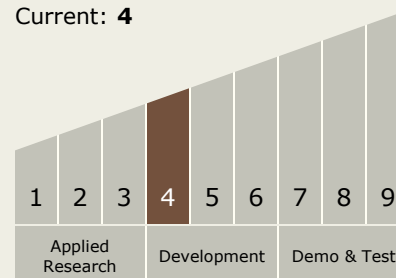
Principal Investigator:

Chris Lomont

Technology Maturity (TRL)

Start: 4

Current: 4



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.2 Extravehicular Activity Systems
 - └ TX06.2.3 Informatics and Decision Support Systems